A BASELINE STUDY OF OCCUPATIONAL ILLNESS AND INJURY CASE MANAGEMENT IN A FEDERAL MARITIME WORK FORCE

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SUMMARY

Problem

In the mid-1980s, the U.S. Public Health Service funded a project to develop an occupational illness and injury contingency management process (OPTICOMAP) that encompassed care coordination, cost containment, and claims management. At the same time, the Naval Health Research Center was tasked with designing and conducting a baseline study and an evaluation program of the efficacy of OPTICOMAP in achieving the aforementioned objectives as well as restoring injured employees to their full potential and enacting successful return-to-work plans. The present or baseline study represents the first phase of this evaluation project, the results of which will be used in comparative analyses with data obtained after OPTICOMAP implementation.

Objectives

The objectives are (a) to discuss the philosophy, development, and roles of the key participants in OPTICOMAP; (b) to describe the levels and methodological approach of the evaluation program; (c) to identify the criteria used to assess the effectiveness of OPTICOMAP or a case management process; (d) to apply the methodological approach to 100 new cases of occupational injury and illness recorded during 1985-86 at two locations of the National Ocean Service, Office of Marine Operations; and (e) to summarize results of these baseline comparisons between the two populations.

Approach

After studying the 28 series of OPTICOMAP developed for the six key participants, the evaluation program was designed, which encompassed the three levels of process, impact, and outcome evaluation. An instrument designed to assess criteria and subcriteria pertinent to the three levels of evaluation was created to evaluate the cases for the present or baseline study and cases recorded from 1987 to 1988 (post-OPTICOMAP). This instrument was used to evaluate the effectiveness of current case management processes at two wage marine work forces of the National Ocean Service, Office of Marine Operations. Individual ratings, which ranged from "1" for noneffective to "5" for effective, were weighted and summed across the subcriteria, and a total score or mean for each criterion was computed. Two raters assessed the cases; when differences in ratings occurred between the two, a compromise rating was

assigned. Mean scores were computed on each criterion and subcriterion and compared between the two locations. A t-test value was computed to determine the level of statistical significance between means, and a chi square was calculated to test the level of significance between two proportions.

Results

Results determined that the highest mean ratings were for provision of immediate and ongoing medical care. The lowest mean ratings in both locations were for meeting the deadlines of claims form filing and for initiating and maintaining contact with the injured employee. Ratings that tended to be somewhat noneffective included opportunities for light duty, timeliness of case closures, and role fulfillment, whereas return-to-work plans for regular duty were rated as somewhat effective. The attending physician was implicated most frequently in delaying the closure of cases. The criteria assessing costs for continuation of pay, medical care, compensation, and adherence to case management also were rated as areas needing an effective cost containment and case management process.

Conclusions

Results point up the need for the implementation of a case management process, such as OPTICOMAP, which has clearly specified service provision events to follow and deadlines to meet. Other objectives accomplished include the creation of an evaluation program and evaluation assessment instrument with quantifiable criteria. The instrument applied to 100 cases of occupational injury and illness identified areas that could be improved and yielded significant differences between two maritime locations.

Recommendations

Adhering to a case management process would prove beneficial in ensuring that claims forms would be filed and cases closed in a timely fashion. Other findings indicate that return-to-work plans should provide increased opportunities for light duty, which would reduce excessive costs for medical care, continuation of pay, and compensation. Developing training programs in effective management of occupational injury cases is recommended, especially for attending physicians. Initiating and maintaining contact with the injured employee throughout the duration of the convalescence also would reduce costs.

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With higher costs projected for medical care and disability payments, governmental agencies, private organizations, and insurance companies have become increasingly aware of the need to implement procedures and programs that will reduce the number of incidents of occupational illness and injury and lower the costs associated with these episodes. In addition to health promotion programs and safety training, many large corporations have initiated case management processes that are designed to address the critical issues of containing costs and managing claims in cases of occupational illness and injury. Honeywell ("Honeywell's Case," 1986) and Chrysler Corporation ("Health Data Help," 1986), for example, have implemented case management programs, both of which focus on reducing health care and disability expenditures. At the end of three years of its cost containment program, Chrysler Corporation reports a savings of more than $100 million. Intracorp, the nation's largest medical case management service, projects a savings to companies of $8 to $13 for each dollar of expenditure for its case managers' services (Zeldis, 1987). It should be noted that these savings may not accrue at first, but case management is less expensive than hospitalization in the long run ("Case Management Alternatives," 1987).

In the mid-1980s, the U.S. Public Health Service contracted with Watchcare Corporation (1987) in Seattle to develop a model process that would encompass not only cost containment but also care coordination and claims management. During the planning stages of this project, the initial goals included the development of the Occupational Illness and Injury Contingency Management Process (OPTICOMAP) and its evaluation program. The Naval Health Research Center, San Diego, was tasked with designing and conducting a baseline study and the evaluation program of the efficacy of OPTICOMAP in achieving the aforementioned objectives as well as restoring injured employees to their full potential and successfully enacting return-to-work plans. At the same time, a federal maritime agency was selected for OPTICOMAP implementation with another comparable operational setting within the agency

serving as the control group. The baseline study centered on assessing current case management procedures in place from October 1985 to September 1986 at these locations. In October 1987, OPTICOMAP was implemented, which signaled the beginning of the testing and evaluation phase.

The present study summarizes results of the first three phases in the sequence outlined for this project: OPTICOMAP development, design of the evaluation program, and completion of the baseline study. To be specific, the objectives are (a) to discuss the philosophy, development, and roles of the key participants in OPTICOMAP; (b) to describe the levels and methodological approach of the evaluation program; (c) to identify the criteria used to assess the effectiveness of OPTICOMAP or a case management process; (d) to apply the methodological approach to 100 new cases of occupational injury and illness recorded during 1985-86 at two locations of the National Ocean Service, Office of Marine Operations; and (e) to summarize results of these baseline comparisons between the two populations.

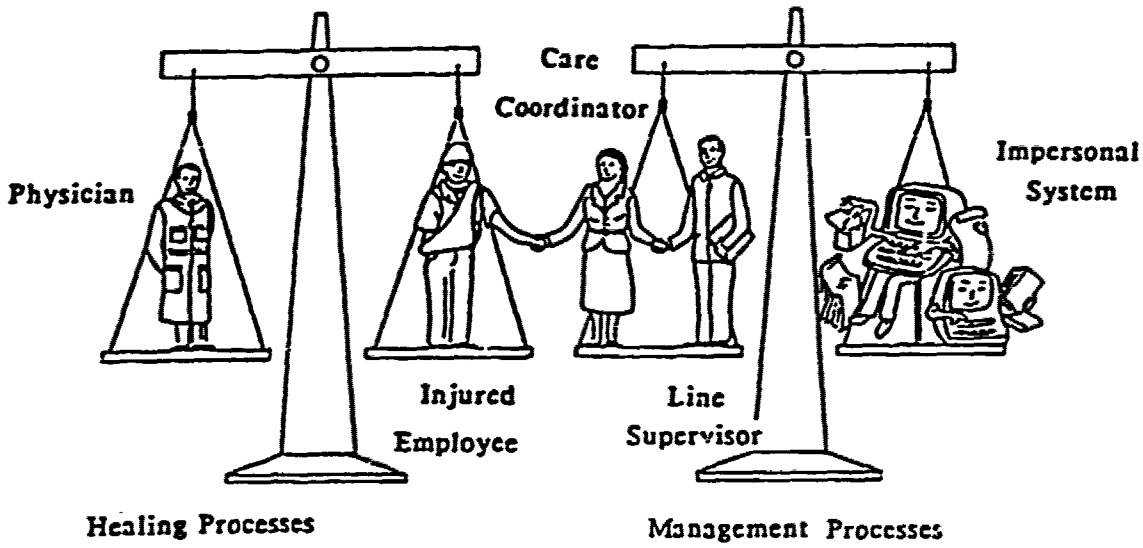
OCCUPATIONAL ILLNESS AND INJURY CONTINGENCY MANAGEMENT PROCESS

OPTICOMAP is based on the philosophy that a management process, first, should strengthen the personal aspects of managing an injured employee case ("Watchcare Corporation," 1987). Implicit in the service provision events of OPTICOMAP, for example, is the conviction that a human voice and face are essential to enhancing the management of each injury case. The human voice and face typically are personified by the case manager or, in the case of OPTICOMAP, the care coordinator-case facilitator (CC-CF). As the key person in the successful operation of OPTICOMAP, the CC-CF combines all of the "claims" functions, such as facilitation of claims paperwork and provision of claims information to the injured employee, with such "care" functions as collection of information from the attending physician, coordination of the return-to-work activity, and a medical services quality control watch. In other words, the CC-CF's role goes beyond claims issues and extends into the realm of care issues.

Second, the other aspect of the underlying philosophy of OPTICOMAP is that an effort also should be made to incorporate an increased understanding of the significance of psychosocial factors with respect to the healing

process. OPTICOMAP emphasizes the importance of returning injured employees to the work place as soon as possible—and, in particular, before they manifest symptoms of delayed recovery syndrome. This two-pronged approach, therefore, should produce a balance in the management process and in the healing partnership (that is, a partnership between the physician and the injured employee), as can be seen in Figure 1. Such a management process promotes close cooperation and a coordinated effort between the medical care process and the workplace, claims process, and injured employee.

Figure 1. Positive Interaction between Management and Healing Processes



Note. From Occupational Illness and Injury Contingency Management Process I. (p. 24) by Watchcare Corporation Research and Development Team, 1987, Seattle, Wash.: U.S. Public Health Service. Reprinted by permission.

In addition to the CC-CF, another key participant in the successful operation of OPTICOMAP is the attending case managing physician (ACMP). The role of the ACMP entails a commitment to the injured employee's overall recovery and to his or her return to work as soon as possible. The ACMP assumes responsibility for completing a physician's report which includes the projected return-to-work dates for light and regular duty. Another form to be completed details the extent of the injured employee's work capacity or duty status. Attention from the ACMP also should be directed toward identifying and resolving delayed recovery issues. OPTICOMAP consists of several series

designed to deal with psychosocial factors and the risk of experiencing symptoms of delayed recovery syndrome.

The third key participant is that of the line supervisor whose role is to arrange for the immediate medical care of the injured employee and to notify the CC-CF of the injury. Other duties include the filing with the CC-CF of appropriate forms specified by the Department of Labor, Office of Workers' Compensation Programs (DOL OWCP), ensuring that ongoing care is provided if needed, and monitoring the return-to-work plan for both light or limited duty as well as regular or modified duty.

The roles of these key participants and those of the other three participants are outlined in the three service tracks of OPTICOMAP: operational, clinical, and environmental. The operational service track consists of the three principal service providers of the line supervisor, the CC-CF, and a medical consultant. The clinical service track includes the primary care provider and the ACMP. And the third service track, the environmental, is defined by the work of the responsible environmental manager—another term for a safety manager. The role of each of these six service providers is presented in 28 separate series, as listed in the Table 1. Computerized versions of the series for each of the six providers also have been prepared. Each comprehensive series identifies the events to be performed to ensure the appropriate management of each case from the time of injury occurrence until the date of case closure.

OPTICOMAP EVALUATION PROGRAM

Evaluation Design and Criteria Creation

As stated at the outset, the first phase of this study was dedicated to the creation of OPTICOMAP, which involved the coordination of the 28 series of service provision events into a cohesive process. With its completion, a study of OPTICOMAP was conducted to ensure that the evaluation program would be inclusive. The foundation of the evaluation program centered on three levels of evaluation: process, impact, and outcome (Green & Lewis, 1986). All relevant aspects of OPTICOMAP were subsumed under these three evaluation levels, as listed in Table 2.

TABLE 1

Occupational Illness and Injury Contingency Management Process (OPTICOMAP): A Process of 28 Series in Three Service Tracks

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Operational Service Track:

Line Supervisor (LS):
- Series L100. Initial Response (Day 1)
- Series L200. Ongoing Care (Days 2 - 14)
- Series L300. Ongoing Claims (Days 1 - 2)

Care Coordinator-Case Facilitator (CC-CF):
- Series C100. Initial Response (Days 1 - 2)
- Series C200. Initial Care (Days 2 - 3)
- Series C300. Early Return to Work (RTW)—"Wait and See" on Early RTW Prognosis Cases (Days 3 - 7)
- Series C400. Later RTW—7 or More Days after Date of Injury (Days 7 - 9)
- Series C500. "Conflict at Work" and "General Ability to Perform" (Days 7 - 10)
- Series C600. Continue RTW Support (Days 10 - 14)
- Series C700. Continue Support for Mitigation of Disability Effects/ Job Site Modification (Days 10 - 14)
- Series C800. Long-term Monitor Responsibility (Days 183 - 3,650)
- Series C900. Initial Traumatic Injury Claims (Days 3 - 4)
- Series C1000. Initial Occupational Illness Claims (Days 4 - 10)
- Series C1100. Ongoing Claims Series (Days 10 - 365)

Medical Consultant (MC):
- Series M100. Ongoing Care
- Series M200. Ongoing Claims

Clinical Service Track:

Primary Care Provider (PCP):
- Series P100. Initial Response (Days 1 - 2)

Attending Case Managing Physician (ACMP):
- Series A100. Initial Care (Days 3 - 7)
- Series A200. Ongoing Care—Medical (Days 8 - 14)
- Series A300. Ongoing Care—Psycho/"Wait and See" (Days 3 - 7)
- Series A400. Ongoing Care—Psycho/Initial Screen (Days 8 - 10)
- Series A500. Ongoing Care—Consider Psycho Support (Day 10)
- Series A600. Ongoing Care—RTW Plan (Days 10 - 14)
- Series A700. Ongoing Care—Job Mod. or Voc. Rehab. (Days 10 - 14)
- Series A800. Post Medical Closure Activity (Days 183 - 3,650)

Environmental Service Track:

Responsible Environmental Manager (REM):
- Series R100. Initial Response (Days 1 - 2)
- Series R200. Ongoing Care (Days 1 - 10)
- Series R300. Ongoing Claims

TABLE 2

Three Facets of an Evaluation Program

Process Evaluation	Impact Evaluation	Outcome Evaluation
Implementation of and Adherence to Process: initial response, initial care, ongoing care	Timeliness: follow-up of case; case management; Department of Labor, Office of Workers' Compensation Programs (DOL OWCP)	Case Closure: obstacles (e.g., hospital/clinic, physician, case manager, DOL OWCP, injured employee)
Return-to-work Plan: implementation of light and/or regular duty plan	Return-to-Work Plan: light or limited duty, regular or new job duty	Return-to-work Plan: number of workers on the job
	Role Fulfillment: line supervisor	Work Time Lost: number of days (e.g, continuation of pay, sick or annual leave, compensation)
	Role Fulfillment: case manager	
	Role Fulfillment: attending physician	Costs: expenditures for medical care, reasonableness of medical care costs
	Role Fulfillment: injured employee	
	Role Fulfillment: DOL OWCP	Costs: expenditures for disability/compensation
	Role Fulfillment: responsible environmental manager	Costs: days for form filing
	Role Fulfillment: primary care provider	Costs: adherence to process (e.g., letters, telephone calls, excessive involvement)
	Role Fulfillment: medical consultant	

For purposes of assessment, criteria were identified for the three evaluation levels: Process evaluation assessed the extent to which OPTICOMAP or a case management process and the return-to-work plan had been implemented and followed. Impact evaluation pertained to the impact that OPTICOMAP or a case management process had on enhancing timeliness, returning workers to the job, and improving each participant's role in case management. Outcome evaluation measured duration of time to effectuate case closure; number of case closures that were delayed; number of injured employees who were returned to work and days lost from work; number of injured employees manifesting delayed recovery syndrome; appropriateness and reasonableness of costs charged to the organization for continuation of pay, compensation and disability, and adherence to OPTICOMAP or a case management process; and numbers of letters and telephone calls recorded for a case. Subcriteria also were identified and weighted according to their contribution to the overall objective value of that particular criterion. An instrument designed to assess these criteria and subcriteria was created to evaluate the 100 cases for the baseline study as well as the cases recorded from 1987 to 1988, subsequent to OPTICOMAP implementation.

Evaluation Approach

Two approaches were used to evaluate the efficacy of OPTICOMAP or a case management process (Sloan, Gruman, & Allegrante, 1987). The first, the normative approach, compared data from case records collected at one site with data obtained at another. The present study employed the normative approach to compare two wage marine work forces on mean criterion ratings that were garnered from the 100 case records of occupational illness or injury. The other approach was labeled a quasi-experiment in that comparisons of collected data were conducted between a site where OPTICOMAP had been implemented with data obtained from another site where a different case management process was followed. Random assignment of cases was not possible, which explained the term of a quasi-experimental, as contrasted with the controlled, or experimental, approach. Both approaches will be used in evaluating the effectiveness of OPTICOMAP after its implementation and testing period, from October 1987 through September 1988. Comparisons will be conducted both between sites as well as between time periods within sites.

METHOD

Procedure

The two maritime operational settings selected for the baseline study included the work forces of wage marines of the National Ocean Service, Office of Marine Operations: one the Pacific Marine Center (PMC) serving the Pacific basin, and the other, the Atlantic Marine Center (AMC) in the Atlantic basin. Recorded during the time period from October 1985 through September 1986, the cases of occupational illness and injury included 68 (in a force of 351 wage marines) from the PMC and 32 (out of 205) from the AMC. These 100 cases occurred either onboard one of 19 vessels, on liberty in a port of call, or at a shore facility while the ship was in port.

The data extracted from these 1985-86 records formed the basis for a two-part report on baseline information in terms of demographic characteristics, epidemiologic analyses, cost containment, and case management assessment. For the first report, which recently was presented in a technical publication, frequency and percentage distributions were compiled for demographic and occupational characteristics by injury or illness site, and comparative analyses were conducted between the PMC and AMC (Hoiberg, 1988).

For the second, or present, report of the baseline study, information from the 100 case records was extracted onto the evaluation instrument, and scores were computed for each criterion and subcriterion. After rating each of the subcriteria on a scale from "1" to "5," a total score or mean for each criterion was computed. The Likert-style values included "1" for noneffective, "2" for somewhat noneffective, "3" for neither effective nor noneffective, "4" for somewhat effective, and "5" for effective. Two raters independently assessed the cases on each of the criteria and subcriteria. When disagreements arose between raters, the differing interpretations of that item were discussed, and a compromise rating was assigned. Mean scores on each criterion were computed and compared between the two basins. Univariate methods of analysis were used in this study: a *t*-test value was computed to determine the level of statistical significance between means, and a chi square was calculated to test the level of significance between two proportions. A two-tailed test of significance was used.

RESULTS

Process Evaluation

Implementation of and adherence to case management. As can be seen in Table 3, the mean ratings of implementation of and adherence to the case management process for both locations (2.66 and 3.07) were neither effective nor noneffective, which suggested that a more efficacious process of managing cases could be created. Of the subcriteria assessed for this domain, the most highly rated were the two variables of Initial Care and Ongoing Care, thereby indicating that injured employees at both locations were appropriately provided with immediate and follow-up care. Instances wherein the employee was not treated immediately occurred in almost all cases of chipped or broken teeth as well as when the injury did not warrant immediate, specialized treatment in port. The subcriterion with the lowest mean ratings at both locations was that of meeting the deadlines established by the Federal Employees' Compensation Act (FECA) for the filing of forms with DOL OWCP. Mean ratings for the variable that assessed initial contact between the injured worker and the case manager and line supervisor also were somewhat noneffective (2.00 and 2.48) which pointed up that improvments could be made, such as adhering to the time frames specified by OPTICOMAP for initiating contact. Although ratings for the two variables of Initial Contact and Claims Form Filing were the lowest for both locations, the values for the AMC were significantly lower than those for the PMC. The other three comparisons did not yield significant differences between the two locations.

Return-to-work plan. Also presented in Table 3 are the ratings of overall effectiveness of return-to-work plans which showed a more highly effective rating (albeit nonsignificant) in PMC than AMC cases. Mean ratings of return-to-work plans for light duty differed significantly between locations, which reflected the relatively few opportunities available for such duty in the AMC. Implementation of return-to-work plans for regular duty, on the other hand, did not differ significantly between locations, and both ratings were above the mid-point. Few cases of occupational illness or injury were assigned to retraining or rehabilitation, especially among the 32 AMC cases.

TABLE 3

Means and Standard Deviations of Process Evaluation Variables of Occupational Illness and Injury Cases in the National Ocean Service Wage Marine Force, FY1986

Criterion/Subcriterion	PMC M	PMC SD	AMC M	AMC SD	t	p
Implementation of and Adherence to Process	3.07	1.12	2.66	1.10	1.75	NS
Initial care within 24 hours	4.08	1.66	4.07	1.68	-0.02	NS
Initial contact with supervisor/case manager	2.55	0.83	2.00	1.03	2.77	.007
Ongoing care received	3.88	1.47	4.38	0.77	-1.62	NS
Claims form filing	2.26	1.43	1.50	1.14	2.65	.009
Return-to-work Plan	3.58	1.53	2.71	1.86	1.83	NS
Return to light work	2.95	1.87	1.44	1.33	2.16	.041
Return to regular work	3.90	1.62	3.06	1.95	1.67	NS

Note. The two fleet operation centers of the National Ocean Service, Office of Marine Operations, are abbreviated to PMC for Pacific Marine Center and AMC for Atlantic Marine Center.

Impact Evaluation

Timeliness. As presented in Table 4, the mean ratings on the criterion of Timeliness indicated that cases were managed significantly more efficiently among PMC injured workers than AMC personnel. The mean ratings for this criterion and the subcriteria tended to fall within a narrow range for both PMC and AMC cases. Comparisons between locations on the subcriterion of Case Management indicated that the PMC case manager was significantly more timely than the AMC manager in administering each case from date of injury to date of closure. Of the subcriteria, the least timely pertained to the lengthy delays in initiating follow-up contact or maintaining contact with the injured worker throughout the convalescence period. Responsiveness of the DOL OWCP claims examiners tended to be neither effective nor noneffective in both locations.

Role fulfillment. In rating the key participants according to fulfillment of their responsiblilities in managing each case, the subcriteria varied

TABLE 4

Means and Standard Deviations of Impact Evaluation Variables of Occupational Illness and Injury Cases in the National Ocean Service Wage Marine Force, FY1986

	PMC		AMC			
Criterion/Subcriterion	M	SD	M	SD	t	p
Timeliness	3.28	1.09	2.81	1.03	2.03	.045
Follow-up of case	2.95	1.50	2.50	1.60	1.12	NS
Case management	3.18	1.29	2.59	1.29	2.10	.038
DOL OWCP	3.05	1.41	2.63	1.30	1.27	NS
Role Fulfillment:						
Line Supervisor	3.10	1.24	2.84	1.17	1.00	NS
Case Manager	3.63	1.04	3.12	1.01	2.31	.023
Attending Physician	3.16	1.39	2.10	0.94	4.36	.000

Note. The two fleet operation centers of the National Ocean Service, Office of Marine Operations, are abbreviated to PMC for Pacific Marine Center and AMC for Atlantic Marine Center.

according to the demands and deadlines specified by OPTICOMAP for each role. As can be inferred from the means presented in Table 4, the most highly rated key participants were case managers. Mean ratings differed significantly between locations for case managers and attending physicians; fulfillment of their various role responsibilities was rated as significantly more effective among PMC than AMC participants.

Outcome Evaluation

Work time lost. In examining the mean ratings in Table 5, no significant differences were observed between locations for the criterion and subcriteria of Work Time Lost. Less than 43% of all injured employees from the PMC and 46.9% from the AMC did not miss any time from work because of their occupational illness or injury. The number of days lost from work ranged from 1 to 91 among PMC personnel (M = 11.1) and from 1 to 161 in the Atlantic basin population (M = 13.5). These values did not include the three injured workers who had not returned to work at the end of the one-year period, one of whom

TABLE 5

Means and Standard Deviations of Outcome Evaluation Variables of Occupational Illness and Injury Cases in the National Ocean Service Wage Marine Force, FY1986

Criterion/Subcriterion	PMC M	PMC SD	AMC M	AMC SD	t	p
Work Time Lost	3.25	1.46	2.65	1.46	1.43	NS
Continuation of pay	3.38	1.44	2.77	1.48	1.30	NS
Sick, annual, shore leave	2.00	1.41	1.83	1.33	0.23	NS
Costs: Reasonableness of Medical Care	2.86	1.41	3.32	1.49	-1.15	NS
Costs: Compensation/Disability	1.50	1.00	3.50	0.71	-	-
Costs: Adherence to Process	3.18	1.46	2.19	1.26	3.31	.001
Letters from case manager	4.66	4.47	4.81	2.88	-0.20	NS
Letters from DOL OWCP	1.50	2.11	2.50	2.59	-2.05	.043
Telephone calls: case manager	1.03	3.54	2.56	3.45	-2.04	.044
Case Closure	2.97	1.66	1.97	1.28	3.02	.003

Note. The two fleet operation centers of the National Ocean Service, Office of Marine Operations, are abbreviated to PMC for Pacific Marine Center and AMC for Atlantic Marine Center.

clearly manifested symptoms of delayed recovery syndrome. The means for continuation of pay days were comparable between the two locations at 7 days.

Costs: Medical care and compensation/disability. Results of comparisons of mean ratings for medical care costs, as presented in Table 5, yeilded no significant differences in the appropriateness or reasonableness of costs between locations. Because of the few cases of injured employees who received compensation or a disability award during FY1986, comparisons on these costs were not conducted.

Costs: Case management involvement. In adhering to a case management process, the PMC overall was rated as significantly more cost effective than the AMC. Slightly more letters per case were mailed and significantly more

telephone calls were recorded from the AMC than PMC case manager. A significantly higher mean number of letters per case originated from the DOL OWCP in the Atlantic than Pacific basin, which reflected a greater involvement of the DOL OWCP in managing cases or requesting information. The values presented in Table 5 are actual means of the numbers of letters and telephone calls recorded per case.

Case closure. Associated with the criterion of Timeliness was Case Closure, which addressed the issue of expediency in managing and closing cases. The mean ratings shown in Table 5 were somewhat less than neither effective nor noneffective for the PMC and less than somewhat noneffective for the AMC, ratings that differed significantly. Such ratings reflected a need for improved case management in both locations.

The subcriteria for this variable identified the key participant(s) or organization that delayed the closure of a case by 30 or more days. Six of these subcriteria are presented in Table 6. The individual implicated most frequently in these computations was the attending physician. Comparisons of percentages in Table 6 revealed that almost one-half (47%) of all cases in the AMC and 28% in the PMC were delayed by the attending physician; the difference between locations on this subcriteria was significant. Hospitals and clinics also were identified as delaying the closure of cases, which in turn caused an increase in letters and telephone calls from case managers and DOL OWCP claims examiners requesting statements, signatures, or the appropriate form to be used in the billing process. Also shown in Table 6 are the percentages of ratings of excessive involvement of the attending physician and all other participants, subcriteria that objectified the extent of communication efforts undertaken to manage cases. The remissness of the AMC attending physician in submitting forms and fulfilling other obligations of his or her role caused an inordinate amount of work on the part of the case manager, DOL OWCP claims examiner, and line supervisor. The percentages presented in Table 6 mirrored a need to provide training and a case management process for attending physicians and other key participants to ensure more effective, and less costly, management of cases.

Table 6

Frequency and Percentage Distribution of Outcome Evaluation Variables of Occupational Illness and Injury Cases in the National Ocean Service Wage Marine Force, FY1986

Criterion/Subcriterion	PMC No.	PMC %	AMC No.	AMC %	χ^2	p
Delayed Case Closure:						
Line supervisor	68	16.2	32	28.1	1.94	NS
Case manager	68	16.2	32	28.1	1.94	NS
Attending physician	68	26.5	32	46.9	4.10	.043
DOL OWCP	68	19.1	32	28.1	1.03	NS
Hospital/clinic	68	20.6	32	25.0	0.25	NS
Injured employee	68	13.2	32	6.2	1.08	NS
Costs: Excessive Involvement:						
Attending physician	68	14.7	32	46.9	12.01	.000
All other participants	68	22.1	32	59.4	13.50	.000

Note. The two fleet operation centers of the National Ocean Service, Office of Marine Operations, are abbreviated to PMC for Pacific Marine Center and AMC for Atlantic Marine Center.

DISCUSSION

In summarizing results of this baseline study, it can be concluded that the development of a program to evaluate a case management process is a feasible endeavor. The evaluation program developed for the OPTICOMAP project goes beyond analyses of such outcome criteria as cost containment and cost effectiveness. The present design includes not only the assessment of cost containment criteria as well as several other outcome variables, but also cess and impact evaluation criteria. Another objective of this study is e creation of an evaluation instrument with quantifiable criteria. The instrument was applied to 100 cases of occupational injury and illness; comparisons of ratings on numerous facets of case management yielded significant differences between two maritime locations and identified areas that could be improved.

Results of this study point up the need for the implementation of a case management process, such as OPTICOMAP, which has clearly specified service

provision events and deadlines to be met by each of the key participants in a case of occupational illness or injury. The most important reason for this statement is the finding that few of the criteria and subcriteria in this study are rated as effective or even exceed the mid-point, except for those assessing provision of medical care for the injured employee. The relatively low mean ratings observed identify several areas of case management where improvements should be made: claims form filing, increasing opportunities for light duty, providing information on role fulfillment for each key participant, improving efficiency of closing cases, and initiating and maintaining contact with injured employees.

Adhering to a case management process would prove beneficial in ensuring that claims forms would be filed in a timely fashion, one of the least effective subcriteria in this study. The timely filing of DOL OWCP forms by key participants would greatly reduce repetitious correspondence and placement of telephone calls in request of forms, information, and statements. A reduction in this unnecessary work would "free up" time for the case manager and DOL OWCP claims examiner to engage in activities that directly benefit the injured worker, such as arranging for his or her enrollment in a rehabilitation program. As a major requirement of OPTICOMAP, another recommendation of this study is to initiate and maintain contact with the injured employee throughout the duration of the case. This personal aspect of a case management process would be expected to yield a quicker return to work and a decrease in cases of delayed recovery syndrome.

While the mean ratings of return-to-work plans for regular duty tend to be somewhat effective in this study, considerable improvement could be made in expanding the opportunities for light duty. The increase in light or limited duty positions would help to return injured employees to the work place, which in turn would reduce the costs of continuation of pay and compensation. It should be noted, however, that in the wage marine force the availability of such jobs both at sea and in port is quite limited. Moreover, all wage marines assigned to a vessel are expected to be not only fit for duty, but fit for sea duty, which entails a higher level of physical readiness than that required for performance of light duty.

The impact of adhering to a case management process also would be reflected by an improvement in the extent of time needed to close cases of occupational illness and injury. Ratings of increased efficiency would result if key participants have a greater understanding of their responsibilities in case management, which are provided in OPTICOMAP's service provision events. The attending physicians in this study, for example, are shown to be remiss in fulfilling their roles in a relatively high number of cases. Training programs also should be developed to teach key participants how to meet their obligations and adhere to a case management process.

To conclude, the development and implementation of a case management process clearly are supported by results of this study. All of the case management endeavors discussed herein have an effect not only on case closure, timeliness, and inefficiencies but also on such "bottom line" issues as decreases in medical care and compensation costs. The most important test, however, will be to evaluate the impact that the implementation of OPTICOMAP has on the issues examined in this study. Using mean ratings compiled in this baseline study, the most critical phase of this project will be to conduct comparative analyses with means obtained from evaluating the cases reported during 1987-88 or after implementation of OPTICOMAP in one of the two locations. Results from analyzing the case records between locations and within locations across time frames will determine the impact that OPTICOMAP has on each criterion and subcriterion.

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This study described the development of a case management process of occupational illness and injury cases (OPTICOMAP), an evaluation program, and an assessment instrument designed to measure the efficacy of the process in meeting the objectives of cost containment, recovery of injured employees, and their return to work. Applied to 100 cases of occupational illness or injury at two locations, results of analyses of the instrument revealed the importance of implementing an effective case management process, filing OWCP forms within specified time frames, developing training programs for key participants in these cases, creating opportunities for return-to-work plans for both light and regular duty, and initiating and maintaining contact with injured employees. The subsequent phase of this project will determine the impact of OPTICOMAP in improving ratings of effectiveness both between locations and within locations across time periods.

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